completing our voyage, when a change drove us again to the N., and as we were again reduced to three pints of water per day each, I thought it prudent to put into King George Sound. Here we met the steam-ship Oneida, which had put back in consequence of some damage to her machinery, and learned with pleasure that Mr. Gregory and party had arrived safely at Sydney, some of the passengers having conversed with members of the expedition.

On the morning of the 6th of March we left King George Sound, and entered Port Jackson on the evening of the 30th.

T. B.

The PRESIDENT then directed attention to a series of paintings, from the pencil of Mr. Baines, illustrating the natural scenery of the regions visited by him.

The second Paper read was:—

2. *Report on the Country between Mount Serle and Lake Torrens, South Australia.* By Assistant-Surveyor G. W. GOYDER.

Communicated by the Right Hon. H. LABOUCHERE, M.P., F.R.G.S., H. M. Secretary for the Colonies.

To the Hon. the Surveyor-General.

Survey Office, July 8, 1857.

SIR—I have the honour to report that, after completing, on the 2nd of May last, the survey of the road from Saltia Creek to Pichi-richi, I proceeded to join the surveyors sent to triangulate the country beyond Mount Serle.

From the summit of Mount Serle, Mount MacKinlay is seen, about 12 miles distant, to the eastward; its rounded top and precipitous sides forming the most prominent feature in the landscape. The eastern plains are clearly perceptible beyond its southern fall, intercepted by that glittering belt of sand described by Mr. Eyre as the eastern wing of Lake Torrens, and which satisfied him of the impracticable nature of the country and the existence of an insuperable barrier to his efforts in that direction.

To the north-east and south-east of Mount Serle, Arcoona Bluff and Mount Rowe, which form the termini of the extended base, present their bold and rugged outlines to the eye; while more to the south the peaks of Constitution and Exertion Hills appear—their undulating spurs extending to the south, behind the southern portion of Mount Serle, which effectually shuts out the view in that direction. To the south-west the Anglopina Pound range is most conspicuous, backed by a variety of picturesque hills—named by the settlers the Cockscomb, MacFarlane Hill, Mounts Hack, Stuart,

Charlie, and Wallace—the latter situated in front of the Pound and at the head of the Mudla-pina Gap, through which the Frome collects its various sources and winds its sinuous way to the north-north-west, until lost amid the chaos of hills skirting the western plains. To the west and north-west the scene is of a more open character, the dry bed of Lake Torrens being dimly visible, and the plain horizon extending from Mount North-west to 12° east of north, where it is broken by Mount Rose, rendering it difficult to define the northern hills, among which the most peculiar only are clearly discernible. Mounts Deception, Scott, and North-west are easily distinguished, likewise a serrated range of considerable elevation beyond the bed of Lake Torrens.

The Mount Thomas Range, distant about 30 miles from Mount Serle, is visible to the north-north-east, over the low lands between Mount Rose and Arcoona Bluff.

Generally speaking, the scenery is too extensive to be easily described; and it is only by attending to particular portions that satisfactory views can be obtained. I saw sufficient to convince me, however, that no difficulty existed to prevent the successful prosecution of the survey; and as the base-line had been measured, and the triangulation fairly commenced by the 26th of May, it only remained for me to ascertain the nature of the country and probable extent of the survey beyond Mount Serle to complete the duty upon which I was engaged.

As I am not aware that the road between Pichi-richi and Mount Serle has been previously described, it may not be out of place to give a brief sketch of the country through which it passes, prior to mentioning that to the north of Mount Serle.

Proceeding northward from the Saltia through the pass, in the direction of Balcarrie—the head station of the Messrs. Ragless—the only objects of interest are the Devil's Peak and Dutchman's Stern, called by the blacks Ngowinyie and Yoorkakadnia. Ngowinyie is situated to the east of the pass, and is the most southern of a series of hills, differing materially in character from the general formation of Flinders Range, and to which I shall again refer when speaking of the ranges forming the various pounds. Its appearance is peculiarly striking and attractive; although the late storms have detached large portions of the peaks, from which it obtains the name given to it by the whites.

Yoorkakadnia is the name given by the blacks to that portion of Flinders Range immediately to the west of the pass—from the particular appearance of the rocks of which it is composed, *kadnia* being the native name for rock or stone. The Dutchman's Stern, how-

ever, is the northern portion of the range, which terminates abruptly in a supposed resemblance to the stern of a Dutch vessel.

About 6 miles north of the pass, a track branches to the left, over Pinkerton Creek, to Kanowie and the western plains; the road to Balcarrie continuing along the plain to Pichi-richi—a creek from which the pass takes its name—and thence to the Wiroughra Creek at Balcarrie, from whence a fine view of the surrounding country is obtained.

From Balcarrie the road bears 30° east of north, in the direction of Watts's Sugarloaf—a conical hill in the range west of Kanyaka—passing over a beautiful grassy flat for about 10 miles to the Woorianda Creek, near its junction with the Kanyaka, when the country becomes more hilly. The road continues for 5 miles farther, in the direction of the Sugarloaf, along the east bank of the Kanyaka, passing the head station of Messrs. Grant and Phillips, which is rapidly assuming the appearance of a village. It then crosses the creek and follows its west bank to its source, immediately beyond which the landscape is exceedingly fine—the Pound Range appearing to the north, with Rawnsley Bluff, Point Bonney, St. Mary's Peak, and Mount Boord in bold relief against the sky—having Chase and Elder Ranges to the right and left, springing from the long rich plains on either side of the Wornoka Creek; while, to the westward, the foreground is occupied by the Wornoka Hill and Venbulli, with its castellated rocks.

After passing the Wornoka, and crossing the plains north of that creek to the water-parting south-east of Elder Range, the country assumes a more broken appearance. The track, following a creek in a northerly direction to its junction with the Arquaba, continues along the banks of that creek to Point Bonney, passing Mr. Frank Marchant's station and Rawnsley Bluff; the former 30, and the latter 38 miles from Kanyaka. The scenery is hilly throughout, and of the most pleasing character; but the roads extremely rough and tortuous, and capable of but little improvement.

Rawnsley Bluff, Point Bonney, St. Mary Peak, and Mount Boord are the highest points of the range surrounding the Wilpina Pound, the only entrance to which is through the gap from which the waters of the Passmore find their way to the eastern plains. Of these pounds there are several in the northern districts, the Wilpina and Anglo-pina being the largest. The whole of the detached ranges, however, partake more or less of this character; and, from their appearance, justify the conclusion that they are of more recent formation than those of Flinders or the main eastern range. In the latter case, the surface is generally covered with fragments of clay-

slate weathered almost to powder, giving the hills a smooth and rounded appearance; the spurs on either side leading by easy slopes to the summit of the main range, showing that the upheaving force had acted uniformly for many miles in one direction; but, in the former, the summits are covered with huge masses of sandstone, which, from the watered appearance of the surface, seems to have been but recently removed from the bed of the ocean; while the perpendicular cliffs, forming into amphitheatres, with the strata inclining steeply inwards, induces the supposition that they have been formed at a time when the earth was submerged and violently convulsed by earthquakes, acting over an immense area, and from various centres, causing the stratified rocks to separate and sink under the superincumbent mass of water into the chasms beneath—while the outer portions were elevated to their present position—exposing the strata from the primary, to rocks of the most recent formation.

The road from Wilpina, the head station of Mr. George Marchant, follows the Passmore for about a mile to the eastward, down a valley of fine gums and groups of pines, and passing through a gap in the range, heads to the north over a broken picturesque country, to Hayward Hill, which must formerly have presented a serious obstacle to teams going north, though lately improved by a cutting made by the settlers. From Hayward Hill, the road descends by gentle undulations to a creek called the Yangana, and thence leaving Hayward Bluff to the westward, it passes over a mixed country; crossing the Eyatenah, Youngoona, and Okultenah Creeks to the Petaton, from whence to the Neuangaran the ground is more level; but from that creek to the Awanagan, the road passes over sharp spurs, emanating from an east and west range, south of Patawata, and crosses, by dangerous sidelings, Observation and Williagan Creeks, into the bed of the Awanagan, where it joins the road from the western plains by Patachilner Creek and Oratunga, the head station of Mr. John Chambers.

After passing through the Awanagan Gap, a few miles north of the junction of the two roads, they again diverge, that to the right passing northward by way of Awanagan Hill, the Patawata Plains, and Narina to the main gap, east of the Anglo-pina Pound, the only difficulty being a steep sideling on the Awanagan Hill which a slight expense would remove, rendering available a road replete with romantic scenery—as also is that to the left of Awanagan Hill, by Waraweena, the station of Messrs. Thomas and Walter Gill; but the latter road is positively dangerous, and ought only to be used for the passage of wheeled vehicles by persons who have previously

examined the track. From Waraweena the road passes northward under Mount Hack, and joins the Narina Road near the entrance to the main gap, through which it passes; and thence, over a rough broken country, crossing the Pinda Creek—and to the east of the police station at Anglo-pina to the Mudla-pina Gap at the head of the Frome, after passing through which, Mount Serle is in sight and all difficulties cease, there being a good road to Owiandina, the station of the MacFarlanes, about 4 miles north-east of Mount Serle.

Leaving Owiandina on the 27th May, I proceeded, accompanied by William Rowe and a settler who had volunteered his company and assistance, in a north-north-east direction to Umbaratana, the station of the Messrs. Thomas, which is at present the farthest out-station, and distant about 25 miles from Owiandina, and about 3 miles south of the Mount bearing their name. The road passes over the low lands already alluded to between Mount Rose and Arcoona Bluff, crossing the Arcoona, Gammon, Fifteen Mile, and Taylor Creeks. But little of the country is seen to the south of the latter creek—Gammon and Apex Hills presenting themselves on the right and left at the more elevated portions of the road; the former a fine hill north of Arcoona Bluff, and the highest portion of a range extending in a north-easterly direction to Benbonyatha—the latter is best seen from Fifteen-mile Creek, about 10 miles west of the road and easily recognized from its name.

Taylor Creek takes its rise under the west side of the Benbonyatha Range, running first to the north-west and afterwards in a north and north-easterly direction, and becoming a tributary to the George, which forms the west branch of supply to Blanchewater, joining the MacDonnell about 2 miles south of St. Mary Pool.

At Taylor Creek, the country becomes more open—forming into well-grassed plains, extending for several miles round Umbaratana, the name of a permanent water in one of the tributaries of the Taylor.

From the Messrs. Thomas we received every attention, and next day proceeded on our journey, crossing the plains to the north-east, and following a water-way until it became a broad deep creek, winding towards the northern plains, through steep and rocky passes, and introducing us to the Yerelina, which is of a similar character, but wider, deeper, the cliffs of greater elevation, and the bed more tortuous and difficult to travel. At sundown we camped opposite some blacks' wurleys—the only good feed for the horses being in their vicinity.

Shortly afterwards I heard the voices of blacks calling to each

other, as if in alarm—most probably exclamations at discovering the proximity of white people to their camp: they must, however, have withdrawn from the neighbourhood immediately, as we heard no more of them. Next day we continued in the same direction, for about 3 miles, to a high conical hill, to the east of the Yerelina, from which we had a splendid view of the country around, which, in point of romantic scenery, surpassed anything of the kind I had ever seen. The Yamba, Nepowie, and Benbonyatha Ranges were visible to the east, south-east, and south—their elevated peaks of sandstone, fashioned by the atmosphere into fantastic forms, rearing their pointed summits high into the air; the ranges interspersed by wide and deep creeks, collecting the water from innumerable gullies on both sides of the ranges, and trending their tortuous way to the north under perpendicular cliffs of enormous elevation, and intercepting the narrow valleys with their wide stony beds, rendering the way—though delightful at first, from the beauty and variety of the scenery—difficult and harassing in the extreme. At noon we camped on the MacDonnell, resuming our journey in the afternoon, but abandoning the rocky bed of the creek, and working our way north over the ranges by bearing—continuing in the same course until noon of the next day, when we cleared the hills, and camped at a deep and permanent water in the bed of the MacDonnell, which we had crossed and re-crossed several times in our northerly course.

In the afternoon we resumed our journey down the dry bed of the creek, which gradually increased in width, with high cliffs on either side, one of which we took to be Trimmer Bluff. About two miles farther down the creek the cliffs contract, and the bed becomes rocky, and difficult to traverse—the men accompanying me passing to the eastward to avoid the rocks, while I ascended a high bluff, to examine the course of the creek beyond, and was well repaid for my trouble, by discovering that a channel, from 60 to 70 feet deep, had been cut out of the solid rock by the action of the water in times of flood, varying in width from 80 to 100 yards, and nearly a mile long, in which lay a magnificent sheet of water, running strongly at the south end, and increasing in depth towards the east bank. The margin on either side was fringed with fine gums, extending down the creek, considerably beyond the spot where the waters were again absorbed into the earth.

This scene, so sudden and unexpected, forming so great a contrast to the arid plains and sandy-looking soil composing the bed of the creek over which we had so lately passed—the placid appearance of the waters, disturbed only by the quiet enjoyment of the water-fowl,

swimming about on its surface—the rich luxuriant foliage and stately gums—afforded a feeling—a pleasure that can only be realized by persons similarly situated to ourselves.

This water, which we named the Freeling, is in latitude 29° 45′ south, and is well situated as a depôt for persons going north, and an easy day's journey from Blanchewater. After making a few sketches, we continued northward for about 12 miles, and camped on a gum-flat, under the west cliff of the valley of the MacDonnell, covered with quantities of succulent herbs and grass, but with no surface water.

On the following morning, while ascending the cliff north-west of our camp, and which we named Camp Hill, we were delighted to observe cockatoos flying over our heads from the north, which augured well for Blanchewater, which we had not yet seen.

From Camp Hill we took observations to Mounts Hopeless and Hopeful, the former bearing 17°, and the latter 31° 30′ south of east, and apparently about 25 miles off. We also took bearings to a conspicuous hill on the north-east, about 4½ miles distant, which we named View Hill, supposing that a good idea of the surrounding country could be obtained from its summit.

On looking round from the elevation upon which we stood, it became evident that the cliffs on either bank of the creek were formerly mere undulations, rising from the general level of the plain, and that the bed in which the creek lay had been gradually washed out by the action of the water to a valley, varying in width from 1 to 4 miles.

The scene from View Hill proved to be as satisfactory as we anticipated, and was uninterrupted for a radius of at least 20 miles. There was no appearance whatever of Lake Torrens, but five large creeks could be seen to the eastward—converging into two—as they inclined to the north-east, and ultimately becoming lost to view in the distance.

Descending View Hill, we proceeded due east, crossing the source of the first creek, and making the second at 3½ miles from the hill; there were large gums growing in the bed, and pigeons flying about, but no surface water. At 7 miles we crossed the third creek with water in its sandy bed, but as this appeared salt, and the banks to be encrusted with the same substance, we were about to turn away; but the horses drinking with avidity induced us to taste the waters, which, to our surprise, we found to be perfectly fresh—and what we supposed to be common salt, a salt of ammonia brought down in solution in times of flood, and deposited upon the banks as the waters subsided, and the moisture became evaporated from the soil in the bed of the creek.

It may appear anomalous that so volatile a substance as ammonia should remain for any time in a salt exposed to the rays of the sun in sufficient quantity to be perceived. That such is the fact may be relied upon, though whether retained by the presence of any other base or not I am unable to say.

Its existence was afterwards detected by Mr. Painter, from a small sample carried in my pocket for upwards of a week, without his being informed that the salt was supposed to contain ammonia; under any circumstances, it is gratifying to know that the waters are fresh—and as I used them for two or three days without feeling the slightest inconvenience, it is reasonable to suppose that there is nothing deleterious contained in them.

A little farther to the eastward we came upon a tributary to the last creek, at a place where a quartz rock cropped out of the earth, a little to the south of which was a pool of permanent water; this rock appeared stratified, and inclined at an angle not exceeding 20° to the south-west. We continued on this bearing for 20 miles from View Hill, until Mount Hopeless bore south by west, crossing about 2 miles to the east of the fifth creek, which we named Jacob's Creek, as it appeared to emanate from the northern run claimed by that gentleman. We afterwards proceeded northward for about 2 miles, and camped in the fork at the junction of the two creeks; the land well grassed and improving in appearance towards the north-east, and the tracks of cattle numerous and recent.

On the 1st of June we traversed about 30 miles of country, extending our observation north to lat. 29° 20′, where the ground became soft and free from stones, the timber in the beds of the creeks assumed a more stunted appearance, and the creeks trended more to the eastward. After zigzaging the country to the south and west, we reached Blanchewater late in the afternoon; and, paying a short visit to St. Mary Pool, camped on the creek for the night.

St. Mary Pool is situated in lat. 29° 30′ south, and about half a mile north of Blanchewater; it is 100 yards wide by 120 long, the edges covered with reeds, and the whole surrounded by gums. The water is on a different level to that of the Blanche, which is a canal-like stream, about a mile long, and from 30 to 40 yards wide, the waters turbid and the banks lined with reeds and gum trees; while the waters of St. Mary Pool, percolating though the intervening rocks, are perfectly clear. There were quantities of teal, ducks, geese, cranes, cockatoos, pigeons, shell-parrots, magpies, curlews, crows, hawks, and other birds, flying about, and numerous tracks of cattle, but none recent.

On the morning of the 2nd we proceeded to a hill about a mile

north-west of Blanchewater, from which we obtained a tolerable view of the country in the immediate vicinity; from whence we directed our attention to a lagoon of fresh water 2 miles farther north, emanating from a number of delicious springs, which extend over a considerable area, the water running in little streams from fissures in the rocks, which protrude for several feet above the plain. Still farther to the north these springs increase in size, and are surrounded by masses of reeds, near which stand the remains of a native encampment. The ground for a considerable distance around is covered with the salt of ammonia, having a similar appearance to snow after a partial thaw, but so nearly resembling the common salt as to make it difficult to divest oneself of the idea that the springs are not really brine.

About half a mile north of the Reedy and Rocky Springs, we ascended a hill, which, although of no great height, was peculiarly conspicuous, and which, from its appearance, we named Weathered Hill; the lower portion being of slate surmounted by a coronet of sandstone—the whole surrounded by sand, separated by the action of the atmosphere from its once elevated summit.

In the extreme distance, to the north and north-east, we perceived a belt of gigantic gums, beyond which appeared a sheet of water with lands on the opposite side evidently increasing in elevation. There also seemed to be a large lake about 10 miles to the east; but this our previous experience told us had no existence. To the north-east, the MacDonnell continued its course, diverging into a number of channels as the rocks neared the surface, and again converging into one as the depth of soil increased. To the south-east, the extreme end of the eastern range was still visible, Mount Hopeful bearing south 32° east, and apparently about 30 miles distant.

From Weathered Hill, we descended in a north-easterly direction to the MacDonnell, following its course down for about 7 miles, passing several large and permanent waters, the last of which, about half a mile long, 50 yards wide, and very deep, was extremely fine, having a native encampment on the eastern bank, at its lower end. The wurleys did not appear to have been used since the rain, however, the floors being caked over and cracked by the heat of the sun. They are constructed in a similar manner to those described by Captain Sturt, and are warm and comfortable, the largest capable of holding from thirty to forty persons, being quite round, from 3 to 4 feet high, and entered by a semicircular opening, through which we were obliged to creep. This water we named the Werta-warta, from the name of the tribe frequenting the plains north of the Blanche.

Next day we continued our course to the north-east, down the bed

of the creek, for about 14 miles, passing over vegetation of the most luxuriant kind, which covers the valley for a width of from 3 to 4 miles; the timber in the creeks changing from lofty gums to a bastard peppermint, which was rapidly assuming a more stunted appearance, and the creeks bending away to the eastward. We then left the MacDonnell, and made for the nearest point of what was rapidly assuming the appearance of an immense lake; and after travelling about 6½ miles to the north-east, our doubts were set at rest—we were in latitude 29° 13′, and stood upon the margin of Lake Torrens, the waters of which were unmistakeably fresh.

From the spot where my observations were taken, the lake stretched from 15 to 20 miles to the north-west, forming a water horizon extending from north-west-by-west to north-west, the south portion terminated by high land running south towards Weathered Hill, at once explaining the cause of the various creeks bending so much to the eastward. An extensive bay is formed inside this promontory, extending southward to west-north-west, when the land again runs out to a point, approaching and passing us by a gentle curve to the east, and inclining gradually to the south-east, and ultimately disappearing in the distance. The north portion of the horizon is terminated by a bluff headland, round which the water appears to extend to the north. This land passes thence to the east, and forms the north boundary of the visible portion of the lake; and, from a higher elevation than that upon which we stood, appeared to extend round to the eastern wing. It is covered with vegetation, as also are several islands seen between the north and south shores, apparently about 5 miles distant from where we stood; their perpendicular cliffs being clearly discerned by aid of the telescope.

From the first, I had anticipated finding large lakes of fresh water at the termination of the various creeks, or one large lake into which a number of them discharged their waters; but in such I should have discovered flood lines, indicating the rise and fall of the waters; and, even supposing them to have attained their maximum height, the vegetation on some portion of the surface inside the water's edge would have revealed this fact. But, in this case, there was an entire absence of such marks, the water's edge being clearly defined; and the bed changing its character so suddenly from an alluvial soil to blue loam, covered by an inch of fine silt, renders it almost beyond the possibility of a doubt, that the surface of the water is subject only to the most trifling variation of level; and the absence of deltas at the embouchures of the creeks tends to show that there is no reacting force, but that the waters, in times of

flood, flow uninterruptedly elsewhere: and I am inclined to believe, in a generally north-west direction.

In using the words unmistakeably fresh with reference to this water, I meant to imply that not only did it appear fresh to the taste, but that also there was no indication whatever of the presence of salt; and I only regretted the absence of the means which would have enabled me to test not only its extent and direction, but also its depths and action.

We afterwards proceeded due west for 20 miles, to obtain a view from the summit of the high land running from the north-west to Weathered Hill—crossing, on our way, two creeks at 10 and 13 miles distance. The first we named Duck Pond Creek, from the existence of two large waters in its bed, one of which was half a mile long, was wide, deep, and fringed with trees similar to the Blanche, with quantities of ducks swimming about. The second we called Mirage Creek, from its forming the boundary of an imaginary lake, which we supposed we were approaching, but which disappeared as we neared the elevated land. It would be perfectly useless to repeat the number of times we were deceived by mirage, and surprised by the enormous refraction peculiar to these plains; some idea of it may be obtained from the fact that the large gums, seen from Weathered Hill to the north, proved to be bushes of from 2 to 4 feet high; and a large hill seen from the summit of Mount Serle, by aid of a powerful glass, and which we estimated at about 3000 feet, dwindled down to 60. In fact, horizontal angles are of little value, and the mere appearance of water no test of its existence; but this deception is only possible when away from water, the difference being so great when in its actual presence as to render deception next to impossible.

On reaching the top of the hills we found them to be composed of table lands and sand hummocks, succeeded by ranges of a better character, forming well grassed basins and valleys; a few of which contained lagoons of fresh water, gathered from the late rains, from which the waters were rapidly evaporating.

Having now ascertained all that was necessary to enable me to give instructions relative to the extent of the survey, we retraced our steps by way of St. Mary Pool and Mount Freeling (the highest of three hills on a range running north-west to the plains, the most northern of which we supposed to be Mr. Eyre's Mount Distance—and named accordingly, the intermediate hill having been previously named Mount Gardner), taking bearings from the various hills named on our route, so as to enable the surveyors to follow and complete the triangulation, which, with favourable

weather, will in all probability be extended to Weathered Hill this season.

On the 9th of June I left Mount Serle on my way to town, after communicating with Mr. Painter, and receiving the report of his progress in the work upon which he was engaged.

During the journey I visited the stations of many of the settlers, from whom I received much useful information, and to the kindness and experience of Mr. Thomas Gill, who supplied me with sketches and local names, I owe the ease with which I was enabled to recognize places previously visited by himself and Mr. Hack.

As Lake Torrens may probably become a depôt for future observations in the northern districts (a properly-constructed boat being placed upon its waters, enabling their nature and extent to be ascertained, and serving as a connecting link between the two shores), I may be permitted to suggest what appears to me to be a very easy method of improving the line of road to that locality, and of rendering a tract of at least 30,000 square miles of country available for pastoral purposes. It is, that the Government should initiate a series of wells by boring—following the principle used in the construction of Artesian wells, but avoiding the use of expensive cylinders, substituting in their stead inexpensive pipes, capable of being soldered together during the progress of the work, and so constructed at the head as to ensure their protection after the water had been obtained.

That this could be done at no great cost, there is little reason to doubt, it being well known that the large quantities of water flowing from the ranges to the plains are not lost by evaporation, but by absorption, and that it would again find its way to the surface, if not prevented by intervening strata of rock or clay; and as to penetrate through these strata is all that is required to obtain a supply of water on the surface of the ground, the expense would be but the tear and wear of the apparatus, the labour of the men required to work it, and the cost of pipes.

That the first well should be sunk at Port Augusta; and, after water had been obtained at that place, the apparatus should be placed at the disposal of the settlers upon the western plains, who would then have an opportunity of forming watering-places at pleasure, and the mountain road would cease to be used as a general line of traffic, and persons desirous of securing runs could obtain land, estimating the probable cost of a sufficient supply of water, by knowing the expense incurred in sinking the well at Port Augusta; and that port would be hastened towards that important position among the ports of the province, which, sooner or later, it

is destined to attain; doing away, at the same time, with an inconvenience and expense known only to those persons residing in or near the township, and supplying a desideratum to the inhabitants, the value of which it is impossible to overrate.

During the journey I made numerous observations on the direction of the magnetic meridian, measuring with the utmost care the general and diurnal variations of the compass, at different altitudes on the same meridian, and in different longitudes on the same parallel; but, being desirous of connecting these with observations made in the vicinity of town, which have been delayed by the unfavourable state of the weather since my return, I withhold the result for the present.

I have the honour to be, Sir,

Your most obedient servant,

G. W. GOYDER,
Assistant Surveyor-General.

COLONEL GAWLER.—It appears to me Lake Torrens is now the most important feature of Australian geography, and the great key to the still unknown interior. I look upon this remarkable discovery, so far to the northward and eastward, as calculated to stimulate our President, and all who are interested in this important subject, to push on with systematic and vigorous exertions.

It is almost incredible that so close to Eyre's barren route there should be a beautiful country, with fresh water, when he had given up all hopes of discovering it. This, I think, should lead us to form more favourable anticipations with reference to the character of the interior. In Australia, oasis and desert do alternate in such an extraordinary manner, that although Sturt found desert on the east, Eyre desert to the south, Gregory the same feature to the north, and Austin again to the west, yet we cannot at all say that the whole of that immense interior, of more than 800 miles in width by above 1400 miles in length, may not contain extensive, well watered, and fertile districts.

Eyre's expedition went out with a view to penetrate into the centre of Australia, as a step towards opening a communication between the south-eastern provinces and the north-western coast. The political and commercial advantages of such a line would, of course, be immense. It would at once connect Australia with India and with England, and open a route by which possibly a line of rail might be run, or, at least, stock might travel; to the rich islands of the Indian Archipelago, and the south-eastern provinces receive the produce of those islands and of China and of India in return. The south-eastern provinces have just what the Indians want,—horses, wool, copper, and stock; and Asia just what the south-eastern provinces want,—tea, sugar, coffee, rice, silks, and cotton.

I really trust that this good land is a genuine discovery. The fresh water lake to the north is a very singular feature. I have no idea that that, or any portion of that immense lake Torrens, has been formed or can be kept up under a sun of 30° from the equator by mere local rains. I believe that the greater portion of the water is produced by extensive river and lake systems which drain the great interior.

Picture to the mind the dimensions of that lake. To judge of it by looking at home, let us place ourselves on Highgate Hill, and, if possible, stretch the eye to Gravesend or Chatham—that is the breadth of it near its south-western

extremity. Carry on this base from London to Newcastle-on-Tyne, diminishing the breadth to twelve miles; then turn that long straight line into something like a horse-shoe shape, and you have the area of *what we know* of Lake Torrens. Such an immense mass of liquid matter cannot be the product of local rains. But we know nothing of the north-west, and nothing more of the north than that which Captain Sturt and Mr. Goyder have pointed out. Though from the hills near Mount Serle the shores of both sides of the lake to the east and west are seen, to the north-west there is an unbounded horizon. Where that goes to no one knows: perhaps to a great internal drainage.

Then there is another feature with which our present subject is connected —that "stony valley," which Sturt crossed, of about thirty miles in breadth, that appeared like the bed of a great watercourse. It could have been but recently under inundation, for there were immense tracts of mud without a blade of grass upon them. The inundation, too, must have been of fresh water, for fresh water pools were found in the vast valley. In such a climate, mud like that would in two or three years certainly produce herbage.

That watercourse, stretching N.N.E. and S.S.W., had been recently inundated, probably by the tropical rains filling an immense reservoir of which we know nothing, but with which Sturt seemed to connect some native traditions. This watercourse, the wastepipe of a more northerly supply, coming down to a point not far from the newly-discovered fresh-water lake, is possibly the means of keeping it up. What a remarkable feature that is! and how fraught with probabilities of more extraordinary country!

My strong persuasion is that, at no very remote period of time, Spencer Gulf was the mouth of a great river that drained the whole of the western interior of Australia. As the Murray drains the eastern interior, and forms Lake Alexandrina, near Encounter Bay, so a great drainage from the west may account for Lake Torrens. As you sail up Spencer Gulf, it has all the appearance of an estuary quite up to what is called Port Augusta. The comparatively narrow mouth near that locality becoming stopped up by the detritus brought down by the rivers, the water has extended itself into the basin that we now see filled, and, perhaps, a great deal farther, forming the immense evaporating pool of the waters of the interior. It is reported that at some seasons there is still a strong current from the lake into Spencer Gulf.

If South Australia were allowed to extend its boundaries three degrees to the west and north, it might perchance take in a tract of country which would send rich produce down to Spencer Gulf. The immense mineral riches of the south-east also might have some repetition. Already has there been a copper deposit discovered near Mount Serle, which is said to promise to rival the Burra-Burra.

It is true these are matters of speculation; but if, on one side, we speculate on a desert, we may, on the other side, with such striking appearances, speculate on good lands and a valuable country. Remember, in that country there are not only the tropical rains falling to the north, but there is the whole sweep of the vapours of the Southern Ocean coming with the prevailing winds from the south-west. I could mention strong atmospheric evidences from personal observation, in which Mr. Eyre, in his narrative, bears me out emphatically—that there is a cool and well watered country to the northward of the Port Lincoln peninsula. Therefore, as I have already intimated, I heartily hope that the discoveries, of which we have just heard, will stimulate the Geographical Society to exert its influence to push on these researches to the uttermost.

I will only say one word more. We have seen great travellers stopped. Leichhardt we have lost; Sturt was stopped; Eyre was turned back to the coast; Gregory was stopped; Austin was stopped. We have tried to take the interior of Australia by assault. Now the late war has made us all tacti-

cians in a degree; it remains for us, therefore, before we give it up, to attempt to take it by sap.

If the interior be really a waterless desert, I would say that it is probably still perfectly traversable. Observation has led me to the strong conviction that the surface-waterless-tertiary deserts of Australia abound with sub-surface water. I should expect to find it at depths in general of not more than 120 feet. If it be so, a progressive system of wells, with depôts, might be carried, with certainty and safety to the party employed, across every intervening desert. Twenty-four wells, about fifty miles from each other, would establish a practicable route (the whole way, if the country be surface-desert) from the south-western extremity of Lake Torrens to Stokes and Gregory Victoria.

The deserts of Australia abound with wood-fuel, and if the water were sometimes salt, boilers and condensers, light enough for bullock drays, might avert the evil.

I have no doubt whatever but that, in the worst of circumstances, Australia may be safely and surely traversed by patient ingenuity; and I would say that the honour of England (if there were no other motive) requires that it should be done.

The PRESIDENT.—With reference to the observations which have fallen from Colonel Gawler, I can, at this late hour, only say that I have come to another conclusion concerning the condition of Central Australia. But, whilst my own views are printed in the last Anniversary Address, I shall willingly stand corrected if his theory, founded upon a personal acquaintance with the country, should prove correct, and that our colonists should be enabled to travel across the interior of that great continent, which is generally considered to be an impassable saline desert.

The third Paper read was :—

3. *Notes from the Mission to Central Africa.*

Communicated by the Earl of CLARENDON, F.R.G.S., H.M. Secretary for Foreign Affairs.

DR. VOGEL, who had arrived at Kuka after an absence of ten months and twelve days, wrote as follows on the 4th of December, 1855 :—

"I am not able to give now a detailed account of what I have seen and done, as arranging my papers, reducing my observations, and making a map, will take at least three weeks more time, but I will describe to you, as well as I can, the road I have taken.*

"On the 20th January I left Kuka for the town of Yacóba, accompanied by Corporal Macguire and four servants. On the road I had to pass through the capital of the large province of Gombé, situated on a large tributary of the Chadda, called

* For astronomical observations upon this route, *see* the first volume of 'The Proceedings of the Royal Geographical Society.' The observations of Dr. Vogel's route from Kuka, south to Tubori, have not reached this Society for calculation. —ED.